

# INTEGRATIVE ECONOMICS

## OECD-NAEC and Baillie Gifford

*In association with Partners for a New Economy (P4NE); New York University Department of Global Public Health (NYU); Institute for New Economic Thinking (INET) Oxford; Santa Fé Institute; European Commission Joint Research Centre (JRC); International Institute for Applied Systems Analysis (IIASA); Fields Institute for Research in Mathematical Sciences; Complex System Institute of Paris idF; Forum New Economy; Rebuilding Macroeconomics; Ecole Polytechnique and Capital Fund Management (CFM)*

## Draft Agenda

5-6 March 2020

OECD Conference Centre, Paris, CC2

Further information: William Hynes – [william.hynes@oecd.org](mailto:william.hynes@oecd.org)



## INTEGRATIVE ECONOMICS

If we want to put people at the centre of economic policy, then economics has to study people. It has to understand how their thoughts, feelings, aspirations, history, and culture interact inside them to produce the decisions and actions visible to the outside world. Understanding people to understand the economy is at the core of [NAEC](#), and is the central issue of this conference on [integrative economics](#). “Integrative” means an economics that calls on the insights and methods of the range of disciplines needed to paint a realistic picture of how the economic system is shaped and helps shape the larger “system of systems” it is part of.

Traditional economics does not provide the tools we need to analyse the many, often irrational-seeming, behaviours that are generated by the uncountable interactions of billions of people, firms and institutions locally or globally, in small groups or as nations, at timescales ranging from nanoseconds to millennia.

The conference invites world experts on state-of-the-art policy applications emerging from [new analytical tools and techniques](#) to show how methodological innovations and interdisciplinary approaches such as agent-based modelling, nowcasting, machine learning, and network analysis could contribute to a better understanding of the complexity and interaction of our economic, financial, social and environmental systems.

### Thursday 5 March

#### 10:00 - 10:45 Opening session

[Gabriela Ramos](#), OECD Chief of Staff and Sherpa

Keynote Speaker (*by video*):

- [Andrew Sheng](#), Distinguished fellow at Fung Global Institute, Chief Advisor to the China Banking Regulatory Commission

#### **“Integrative and Disintegrative Economics”**

*Economics has followed the scientific revolution along reductionist, timeless, universal principles/models that aim for a “Theory of Everything”. In practice, the economics discipline increasingly fragments into “disintegrative” specialist fields, becoming more complex and diverse.*

*Reductionist scientific thinking breaks down complex problems into component parts – studying deeper and deeper - but often forgets to put these divergent parts back to see whether the whole systemic fits. Mainstream economics remain linear, mechanistic in thinking, whereas natural science and other social sciences have shifted into relativity/quantum thinking of probabilistic/evolving complexity.*

*Neo-classical general equilibrium thinking is a sub-system trying to explain an open giant complex universe that may be impossible to compute (polanyi/environmental critique of market thinking). We are back to narrative (qualitative) explanations with quantitative tools. Complexity economics will get more complex, but integrative themes exist in the exploration of energy, information, knowledge and AI concepts, tools and computing power.*

#### 10:45 – 12:30 Session 1: Understanding Agent Zero

Joshua Epstein’s *Agent\_Zero* is the final book in his trilogy on agent-based modelling, after *Growing Artificial Societies: Social Science from the Bottom Up*, with Robert Axtell, and *Generative Social Science: Studies in Agent-Based Computational Modeling*. *Agent\_Zero* is a software individual, or “agent,” endowed with distinct emotional/affective, cognitive/deliberative, and social modules. Grounded in contemporary neuroscience, these internal components interact to generate observed, often far-from-rational, individual behaviour. When multiple agents of this new type move and interact spatially, they collectively generate an astonishing range of dynamics spanning the fields of social conflict, psychology, public health, law, network science, and economics.

Chair: [Gabriela Ramos](#), OECD Chief of Staff and Sherpa

Keynote Speaker:

- [Joshua M. Epstein](#), Professor of Epidemiology, New York University School of Global Public Health and External Professor, Santa Fe Institute

#### **“Agent\_Zero and Integrative Economics”**

*Epstein will discuss contagion in general and Corona specifically, and will demonstrate his Planetary Model, to illustrate how novel pathogens can spread globally. Then he will explain that we are in a coupled contagion of disease and fear, demonstrating a model on this that gives the condition where fear spreads faster than disease. He proposes to adapt the model where the contagious fear response is not self-isolation from a virus, but financial panic, and even propose that we calibrate the model to*



---

*the current coupled Corona and market dynamics, as an integrative move. He will then introduce Agent\_Zero as a cognitively plausible alternative to the rational actor, demonstrating core phenomena in a range of fields, proposing that we use it to take animal spirits seriously in economic models, closing with a discussion of several new directions.*

Discussants:

- [Alan Kirman](#), Chief Advisor to the NAEC Initiative
- [Michele Cecchini](#), Principal Administrator, Public Health Division, Employment, Labour and Social Affairs Directorate, OECD

---

12:30 – 14:00 Lunch

## 14:00 – 15:45 **Session 2 : Systems Modelling**

Agent-based models (ABM) are a method of simulating complex systems including ecosystems, pandemics, markets, energy generation and distribution, and weather and climate, as well as societal phenomena such as urbanisation, traffic flows, and migration. An ABM defines simple rules and behaviours for individual components such as people or firms (agents) as well as their environment. Aggregating these rules allows the general behaviour of the system to be seen. In ABM, the macro-level behaviour of a system emerges from the simple micro-rules of individual behaviour. In contrast to conventional models, ABM make no assumptions about the existence of efficient policies or general equilibrium. ABM are used to study complex systems. Financial analysts use ABM to incorporate system characteristics that conventional models have difficulty coping with, such as emergence or radical uncertainty.

Chair: [Mame Fatou Diagne](#), Head of Country Studies Division, Economics Department, OECD

Keynote Speaker:

- [Jean-Philippe Bouchaud](#), Chairman, Capital Fund Management (CFM) and Rebuilding Macroeconomics

Discussant:

- [Elena Rovenskaya](#), Programme Director, Advanced Systems Analysis, International Institute for Applied Systems Analysis (IIASA)

---

15:45 - 16:00 Break

## 16:00 - 18:00 **Session 3 : A Systematic Approach to the Socio-economic System**

The economic system is social by nature. No individual, firm or organisation ever acts independently, and the behaviour of one is conditioned by that of others. That means we cannot focus on individual behaviour and add up the actions of individuals to determine the behaviour of the aggregate. We need to analyse and understand how behaviours and characteristics emerge from multiple interactions. However, the increasing complexity of the socio-economic system and the pace of change brought about by trends such as digitalisation, globalisation, and demographic shifts cannot be described satisfactorily by traditional approaches based on reducing the system to individual entities maximising their individual utility functions. This session discusses analytical approaches first developed in biology, psychology, the neurosciences, and statistical physics that are now being used to study emergent socio-economic phenomena.

Chair: [Stefano Scarpetta](#), Director of the Employment, Labour and Social Affairs Directorate, OECD

Keynote Speaker:

- [J. Doyne Farmer](#), Director of Complexity Economics, Institute for New Economic Thinking, and Santa Fe Institute, and Rebuilding Macroeconomics  
**“The Complexity Economics Revolution: What is it and Why is it so Controversial?”**

*Complexity economics proposes a radical change to the standard approach to constructing economic theories. It advocates models for agent behaviour based directly on decision-making, rather than based on maximising utility. This abandons the 150 year old foundation of economic theory, so it is not surprising that this is controversial. I will explain why this is necessary, and argue that it should be*



*viewed as a complement rather than a substitute for the traditional approach. There are many benefits that come from making this big step, many challenges that must be overcome, and a few examples where it is already succeeding. In particular, complexity economics models are much more easily connected to the broader socio-economic system, and can potentially shed new light on problems like inequality.*

Discussant:

- [Penny Mealy](#), Postdoctoral Research Officer, Institute for New Economic Thinking, University of Oxford

## Friday 6 March

9:30 – 11:15

### Session 4: A Systems Approach to Environmental Challenges

The world is facing an increasing number of environmental challenges that threaten economic growth, societal prosperity, and individual and community well-being. There are mounting concerns that environmental tipping points are being reached, if not already being breached, and that this will trigger irreversible environmental shifts and exacerbate related impacts, including on the economy. This session will discuss drawbacks in the way economics has sometimes modelled the interaction between the economic and environmental system. It will discuss new integrated assessment models for climate change with stock-flow consistent (SFC) macroeconomic models. These alternative models have much richer dynamic outcomes and allow the exploration of nonlinear feedback loops that are entirely absent from traditional models, in particular the crucial interaction between private debt, economic activity, and global temperature.

Opening remarks: [Irena Sodin](#), Ambassador to the OECD, Permanent Representative of Slovenia

Chair: [Michael Jacobs](#), Professorial Research Fellow, Sheffield Political Economy Research Institute (SPERI)

Keynote Speaker:

- [Matheus Grasselli](#), Professor of Mathematics, McMaster University and the Fields Institute for Research in Mathematical Sciences, Toronto

#### **“Climate Change, Finance, and Macroeconomics”**

*Most integrated assessment models (IAM) for climate change, such as the Dynamic Integrated Climate-Economic (DICE) model popularised by Nobel laureate William Nordhaus, have at their core an economic module that is based on the mainstream macroeconomic paradigm of Dynamic Stochastic General Equilibrium (DSGE) models. These economic models have been the subject of intense criticism since the last financial crisis not only for their inability to predict or explain financial instabilities, but also for their adherence to “micro-foundations” that are at odds with observed behaviour of agents and lack of rigour in statistical validation.*

*Professor Grasselli will review some recent work that proposes new integrated assessment models for climate change where the DSGE core is replaced by stock-flow consistent (SFC) macroeconomic models. These alternative models have much richer dynamic outcomes and allow the exploration of nonlinear feedback loops that are entirely absent from DICE models, in particular the crucial interaction between private debt, economic activity, and global temperature.*

Discussants:

- [Shardul Agrawala](#), Head of the Environment and Economy Integration Division of the Environment Directorate, OECD
- [Joel Guiot](#), Distinguished Research Fellow, CNRS, France

11:15 – 11:30 Break

### 11:30 – 13:00 Session 5: The Financial System

Over a decade after the collapse of Lehman Brothers and the start of the Global Financial Crisis of 2008, the world is once again faced with increasing financial uncertainty. Though many lessons of financial governance were learned in the aftermath of the Crisis, core methodological and governance limitations remain that expose many countries and



companies to systemic risks. These threats are too complex to be eliminated, or even mitigated, using the traditional approaches of economic modelling and risk assessment that failed to see the crisis coming and could not explain how the financial crisis became the Great Recession. These approaches see the economic system as basically in equilibrium until an external shock throws it off balance. They focus primarily upon hardening a system to a specific and predictable threat, and are less capable of addressing the outcomes or uncertainties stemming from financial and economic interconnectivity. New approaches derived from complex systems theory and physics offer a more realistic vision.

Keynote Speaker: [Angus Armstrong](#), Director of Rebuilding Macroeconomics Network

### ***“Misuse and Use of Economic Models in the Crisis”***

*There is a widely held view that economic models were of little use during the Global Financial Crisis. Leading central bankers including Trichet (ECB), King (Bank of England) and Kotcherlakota (Fed) have suggested that macro models provided little guidance for policy central bank making. But this is only half the story. Finance ministries were responsible for some of the biggest policy interventions during the crisis. In the UK Treasury at least, the use of economic models was far more nuanced. Some economic models were in fact central to designing some of the largest policy interventions in the UK. This is not just a matter of setting a historical record straight. Recognising which models were useful may provide some guide for the future, especially if we find ourselves in a similar situation. Also knowing what we wished we could have done but did not have the capability might provide useful suggestions for the future direction of policy-orientated economic modelling.*

Discussants:

- [Michael Benzaquen](#), Chair of Econophysics & Complex Systems, LadHyX - CNRS - Ecole Polytechnique
- [Elena Rovenskaya](#), Programme Director, Advanced Systems Analysis, International Institute for Applied Systems Analysis (IIASA)

13:00

**Closing remarks**